Un Artículo Técnico de Aplein Ingenieros S.A.

Analysis of combined cycle trips

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A large part of the new combined cycle budget is being invested in the turbine. Its useful life will have a very significant effect on the project's economic results.

The number of start-ups has a highly significant influence on turbine reliability, and this is the basic reason why the number of start-ups should be kept to the bare minimum during commissioning.

The multi-function transient recorder becomes an essential element when analysing trips having an electrical origin that may be produced.

Although today's protection equipment includes a transient recorder function, the great advantage of a multi-function transient recorder when compared to them, is that it enables the system to be analysed as a single assembly and not each protection system as an individual element.

ENDESA is equipping its latest combined cycle units with trip monitoring cabinets for each generator group, whether employing gas or steam turbines.

Each cabinet includes a AMETEK TR2116 multi-function transient recorder, together with a printer for immediate graphical recording of all captured events.

Voltage and current signals from the generator, busbar voltages and main and auxiliary transformer currents are connected to the cabinets terminal strips, together with the line, generator and excitation breaker positions. Signals produced by the trip and group protection relays are also recorded, together with those from substation protection.

The multi-function transient recorder provides constant monitoring facilities, storing the maximum values and the minimum rms values of voltages and currents every minute, producing very useful information with respect to system stability.

Whenever any of the indicated conditions occurs, whether a digital signal status change or variation in an analogue signal level either above or below the configured value, the multi-function transient recorder will simultaneously store the data for all the inputs for a period beginning before the failure and continuing until conditions return to normal. The obtained data will enable analysis to be carried out to determine whether protection operation and sequence are correct or not.

The multi-function transient recorders are integrated into the plants communications network (or into the corporate network for communications with a control centre) via a TCP/IP network connection. The information held in the multi-function transient recorder is recovered for subsequent analysis in the control room and the voltage and current values which are being generated can also be displayed in real-time.

Synchronisation with the other plant equipment is achieved via reception of the IRIG-B signal from the general GPS clock.

The multi-function transient recorders form an extremely valuable commissioning tool. The recorders store and can later use the data in comparisons with later behaviour in future diagnostic checks, together with the behaviour of other generating groups under similar circumstances.